U.S. Department of Energy
and the
National Science Foundation

JAN 23 2008

Professor Mel Shochet
Chair, HEPAP
Enrico Fermi Institute
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Chicago, Illinois 60637

Dear Professor Shochet:

The scientific opportunities for the U.S. high energy physics program have been identified and articulated in a number of reports generated over the last few years by the High Energy Physics Advisory Panel (HEPAP), the National Academy of Sciences (NAS), the American Physical Society (APS) and other scientific bodies. These studies have addressed and evaluated the priority of the important scientific opportunities; however, in most cases this was not done under any constraint on the resources needed. The exception to this was the Particle Physics Project Prioritization Panel (P5) report, whose first part was submitted in October 2006 and second in November 2007. The agencies have found this report to be informative and useful in their planning. However, circumstances have changed over the almost two years since the original charge was given to P5, and additional guidance is now requested by the agencies.

Since DOE/NSF issued the charge to P5 in January 2006, new information has been obtained regarding FY 2007, FY 2008 and projected out-year funding and the status of major projects. Most significant, for the strategic planning for this scientific field, is that the timescale for construction of the ILC has come into better focus in the last year. External factors, including the nature of Terascale physics to be discovered at the LHC and the internationalization required to realize the ILC, now imply an earliest possible construction start near mid-2010's. Accordingly, at the February 2007 HEPAP meeting, Dr. Raymond Orbach requested a renewed discussion of the future of U.S. particle physics during the transition period from the LHC to the ILC. He asked for a critical examination of the investments that would be needed to ensure the vitality, scientific productivity, and discovery potential of the field during the next two to three decades. There is a need at this time to understand the priorities, options, impacts and scientific deliverables for the U.S. program at various funding levels over the next ten year period.

To that end, we request that HEPAP re-examine current and planned U.S. research capabilities and assess their role and potential for scientific advancement, and determine the time and resources (the facilities, personnel, research and development and capital investments) needed to achieve the planned programs, subject to the revised budgetary and external constraints indicated above. HEPAP should then identify and evaluate the scientific opportunities and options that can be pursued at different funding levels for mounting a world-class, vigorous and productive national particle physics science program.

These evaluations should be done in the context of the increasingly necessary internationalization of particle physics while recognizing the need to maintain a healthy, flexible, domestic high energy physics infrastructure. Since Fermilab will be the single dedicated U.S. HEP user facility after 2008, it is important to understand and evaluate the role Fermilab will play in the national and worldwide context of particle physics over the next two decades. In response to Dr. Orbach's inquiry, Fermilab has completed a strategic planning process described in the *Fermilab Steering Group Report* document, the content of which should be evaluated in your planning exercise.

A U.S. strategic plan to implement the highest priority science in the context of available funding and world-wide capabilities and collaborations must be developed. Your report should provide recommendations on the priorities for an optimized high energy physics program over the next ten years (FY 2009-2018), under the following four funding profile scenarios:

- Constant effort at the FY 2008 funding level (i.e.; funding in FY 2009 at the level provided by the FY 2008 Omnibus Bill inflated by 3.5% and thereafter inflated by 3.5% per year in the out-years)
- Constant effort at the FY 2007 funding level (i.e.; funding in FY 2009 at the level provided in FY 2007 inflated 3.5% per year over two years and thereafter inflated by a 3.5% in the out-years).
- Doubling of funding over a ten year period starting in FY 2007 (i.e.; funding in FY 2009 at the level provided in FY 2007 inflated 6.5.% per year over two years and thereafter inflated by 6.5% per year in the out-years)
- Additional funding above the previous level, in priority order, associated with specific activities needed to mount a leadership program that addresses the scientific opportunities identified in the EPP2010 report.

The report should discuss the current facilities and instrumentation that can be used to carry out parts of the planned program as well as new facilities and instrumentation that will need to be developed by the DOE and NSF in order to mount a productive, forefront program for each of the funding scenarios. The report should articulate the scientific opportunities which can and cannot be pursued, the overall level of support that is needed in the core research and advanced technology R&D programs to achieve these opportunities in the various scenarios, and the impacts on training of high energy and

accelerator physicists as well as the broader scientific community. The report should also provide a detailed perspective on how the pursuit of possible major initiatives (such as DUSEL, ILC, Project X, etc.) would fit (or not) into the program you recommend in each of the scenarios.

We would appreciate the committee's preliminary comments by March 1, 2008 and a final report by April 15, 2008. We understand this is a difficult task; however, your considerations on these issues will be an essential input to planning at both the DOE and NSF.

Sincerely,

Dr. Dennis Kovar
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for High Energy Physics
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